



1/22/07 AF

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No. : 10/748,520  
Applicant : SPITSBERG, ET AL.  
Filed : DECEMBER 30, 2003  
Title : CERAMIC COMPOSITIONS USEFUL IN THERMAL BARRIER  
COATINGS HAVING REDUCED THERMAL CONDUCTIVITY

Art Unit : 1775  
Examiner : IVEY, ELIZABETH D.

Atty Docket No. : 129968

Mail Stop: Appeal Brief - Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

The below-identified communication(s) is (are) submitted in the above-captioned application or proceeding:

- Appellants' Appeal Brief Transmittal Cover Sheet (1 page);
- Appeal Brief Fee Transmittal with authorization to charge Deposit Account (1 page);
- Appellants' Appeal Brief (17 pages);
- Credit Card Form (1 page);
- The Commissioner is hereby authorized to charge payment of any fees associated with this communication, including fees under 37 C.F.R. §§ 1.16 and 1.17 or credit any overpayment to **Deposit Account Number 10-0233-129968(GEAE-0032-UTY)**.

Respectfully submitted,

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January 22, 2007

# Patent Fee Transmittal for FY 2007

Applicant(s) Claims Small Entity Status 37 C.F.R. 1.27

**TOTAL AMOUNT OF PAYMENT** **\$500.00**

Application No. 10/748,520  
Filing Date December 30, 2003  
Named Inventor SPITSBERG, et al.  
Examiner Name IVEY, Elizabeth D.  
Art Unit 1775  
Attorney Docket No. 129968



## FEE CALCULATION

### 1. Filing Fees

Application Type	Description	Large Entity		Small Entity		Paid
		Code	(\$)	Code	(\$)	
Utility	Basic	1011	300	2011	150	\$ -
	Examination	1311	200	2311	100	\$ -
	Search	1111	500	2111	250	\$ -
Design	Basic	1012	200	2012	100	\$ -
	Examination	1312	130	2312	65	\$ -
	Search	1112	100	2112	50	\$ -
Plant	Basic	1013	200	2013	100	\$ -
	Examination	1313	160	2313	80	\$ -
	Search	1113	300	2113	150	\$ -
Reissue	Basic	1014	300	2014	150	\$ -
	Examination	1114	600	2114	300	\$ -
	Search	1314	500	2314	250	\$ -
Provisional	Basic	1005	200	2005	100	\$ -
National Stage	Basic	1631	300	2631	150	\$ -
	Examination	1633	200	2633	100	\$ -
	Search	1632	500	2632	250	\$ -

### 4. Additional Fees

Description	Large Entity			Small Entity		
	Code	(\$)	Code	(\$)	Paid	
Extension for response first month	1251	120	2251	60	\$ -	
Extension for response second month	1252	450	2252	225	\$ -	
Extension for response third month	1253	1,020	2253	510	\$ -	
Extension for response fourth month	1254	1,590	2254	795	\$ -	
Extension for response fifth month	1255	2,160	2255	1,080	\$ -	
Notice of Appeal	1401	500	2401	250	\$ -	
Filing a Brief in Support of an Appeal	1402	500	2402	250	\$ 500	
Request for Oral hearing	1403	1,000	2403	500	\$ -	
Petitions under 1.17(f)	1462	400	1462	400	\$ -	
Petitions under 1.17(g)	1463	200	1463	200	\$ -	
Petitions under 1.17(h)	1464	130	1464	130	\$ -	
Petition - public use proceeding	1451	1,510	1451	1,510	\$ -	
Petition to Revive - Unavoidable	1452	500	2452	250	\$ -	
Petition to Revive - Unintentional	1453	1,500	2453	750	\$ -	
Utility Issue Fee	1501	1,400	2501	700	\$ -	
Design Issue Fee	1502	800	2502	400	\$ -	
Plant Issue Fee	1503	1,100	2503	550	\$ -	
Reissue Issue Fee	1511	1,400	2511	700	\$ -	
Publication Fee	1504	300	1504	300	\$ -	
Statutory Disclaimer	1814	130	2814	65	\$ -	

(cont.)

### 2. Extra Claim Fee

#### a. Claims as Filed

Total Claims	Independent	Multiple Dependent	Extra Claims		Paid
			Code	(\$)	
0	0	0	0	0	\$ -
0	0	0	0	0	\$ -
0	0	0	0	0	\$ -

#### b. Claims as Amended

Total Claims	Independent	First Presentation of Multiple Dependent	Present Extra		Paid
			After Amnt	Highest Paid	
20	3	0	28	0	\$ -
3	3	0	3	0	\$ -
0	0	0	0	0	\$ -

\* Less than 20, enter 20 \*\* Less than 3, enter 3

### 3. Extra Page Fee

Total Pages	Extra Pages	Large Entity			Small Entity			Paid
		Code	(\$)	Code	(\$)	Code	(\$)	
0	0	1081	250	2081	125			\$ -

#### Subtotal for Application Fees

1	\$	+	2	\$	+	3	\$	=	\$	-
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### Description (cont.)

Description	Code	(\$)	Code	(\$)	Paid
Recording each Assignment	8021	40	8021	40	\$ -
Submission of IDS	1806	180	1806	180	\$ -
Request for Cont. Examination (RCE)	1801	790	2801	395	\$ -
Filing Submission After Final	1809	790	2809	395	\$ -
Surcharge - late filing fee or oath	1051	130	2051	65	\$ -
Surcharge - late provisional fee	1052	50	2052	25	\$ -
Non-English Specification	1053	130	1053	130	\$ -
Processing Fee 37 CFR 1.17(q)	1807	50	1807	50	\$ -
Request for Ex Parte Reexamination	1812	2,520	1812	2,520	\$ -
Request Pub. of SIR prior to action	1804	920	1804	920	\$ -
Request Pub. of SIR after action	1805	1,840	1805	1,840	\$ -
Each Add. Invention Examined	1810	790	2810	395	\$ -
Expedited Examination (Design)	1802	900	1802	900	\$ -
Unintentionally Delayed Priority Claim	1453	1,370	1453	1,370	\$ -
Certificate of Correction	1811	100	1811	100	\$ -
Maintenance Fees 3.5 years	1551	900	2551	450	\$ -
Maintenance Fees 7.5 years	1552	2,300	2552	1,150	\$ -
Maintenance Fees 11.5 years	1553	3,800	2553	1,900	\$ -
Surcharge - Late Payment 6 mos.	1554	130	2554	65	\$ -
Other fee					\$ -

Additional Fee Subtotal 4 \$ 500

### METHOD OF PAYMENT (Check all that apply)

Credit Card (Provide credit card information and authorization on PTO-2038)  
 Deposit Account No. 10-0233-GEAE-0032-UTY

For the above-identified deposit account, the Director is hereby authorized to:

To charge the above-identified fee.  
 To charge any additional fees which may be required under 37 CFR 1.16, 1.17, 1.18, 1.20 and 1.492 or credit any overpayment to the deposit account number listed above.

Submitted by:

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January 22, 2007

Signature

Include duplicate copy if paying by deposit account



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**  
**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Application No. : 10/748,520  
Appellants/Applicants : SPITSBERG, *et al.*  
Filed : DECEMBER 30, 2003  
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Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPELLANTS' APPEAL BRIEF**

Sir:

This is an appeal of Claims 1-2, 6-12, 16-25, and 28 currently pending in Appellants' application that were rejected by the Examiner in an Office Action (made FINAL) dated August 24, 2006. A timely Notice of Appeal was submitted by Appellants to the Patent and Trademark Office on November 21, 2006. Appellants' Appeal Brief is being timely submitted herewith in support of their appeal to the Board of Appeals and Patent Interferences (Board), together with the requisite fee of \$500.00.

**I. REAL PARTY IN INTEREST**

The real party in interest is The General Electric Company, the assignee of Appellants'.

**II. RELATED APPEALS AND INTERFERENCES**

There are currently no appeals or interferences known to Appellants, Appellants' legal representative, or the assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

### III. STATUS OF CLAIMS

Claims 1-2, 6-12, 16-25, and 28 are currently pending and are the only rejected claims on appeal; Claims 3-5, 13-15 and 26-27 have been cancelled. A clean copy of Claims 1-2, 6-12, 16-25, and 28 on appeal appears in the attached Claims Appendix.

### IV. STATUS OF AMENDMENTS

No amendment was filed by Appellants pursuant to 37 C.F.R. 1.116(b) in response to the Final Office Action dated August 24, 2006.

### V. SUMMARY OF CLAIMED SUBJECT MATTER

Appellants' claimed invention generally relates to ceramic compositions that provide several benefits when used to provide thermal barrier coatings 22 for metal substrates 14 of thermally protected articles 10, such as turbine components, exposed to high temperatures. (See, for example, paragraph [0012] at page 4 of Appellants' application; FIG. 4.) Appellants' claimed ceramic compositions comprise: (1) at least about 91 mole % (e.g., from about 92 to about 95 mole %) zirconia; and (2) from about 5 to about 8 mole % (e.g., from about 5.5 to about 6.5 mole %) of a stabilizer component comprising: (a) yttria in an amount of from about 4 to about 6 mole % (e.g., from about 4 to about 5 mole %) of the composition; and (b) lanthana in an amount of from about 0.8 to about 2 mole % (e.g., from about 0.8 to about 1.5 mole %) of the composition, wherein (3) the composition has a mole % ratio of lanthana to total stabilizing component of from about 0.15 to about 0.35 (e.g., from about 0.2 to about 0.3). (See, for example, independent Claim 1, as well as dependent Claims 2 and 6-7; paragraph [0009] at page 3, paragraph [0021] at page 5, and paragraph [0028] at page 8 of the Appellants' application.)

Thermal barrier coatings 22 prepared from these claimed ceramic compositions have a reduced or minimized tendency to sinter, including thermal barrier coatings prepared by physical vapor deposition (PVD) techniques, such as

electron beam physical vapor deposition (EB-PVD), that form columnar, strain-tolerant microstructures. Thermal barrier coatings 22 prepared from these ceramic compositions can also possess reduced intrinsic conductivity. As a result, the thermal barrier coatings 22 prepared from these ceramic compositions are able to maintain their reduced thermal conductivity over time and during exposure to higher temperatures, as well as temperature cycling. (See, for example, paragraph [0012] at page 4 of Appellants' application; FIG. 4.)

Appellants' claimed invention also relates to thermally protected articles 14 which comprise: (A) a metal substrate 14; and (B) a thermal barrier coating 22 comprising: (1) at least about 91 mole % (e.g., from about 92 to about 95 mole %) zirconia; and (2) from about 5 to about 8 mole % (e.g., from about 5.5 to about 6.5 mole %) of a stabilizer component comprising: (a) yttria in an amount of from about 4 to about 6 mole % (e.g., from about 4 to about 5 mole %) of the composition; and (b) lanthana in an amount of from about 0.8 to about 2 mole % (e.g., from about 0.8 to about 1.5 mole %) of the composition, wherein (3) the composition has a mole % ratio of lanthana to total stabilizing component of from about 0.15 to about 0.35 (e.g., from about 0.2 to about 0.3). (See, for example, independent Claim 8, as well as dependent Claims 2 and 6-7; paragraphs [0009]-[0010] at page 3, paragraph [0021] at page 5, and paragraph [0028] at page 8 of the Appellants' application; FIG. 4.)

The thermal barrier coating of Appellants claimed articles may comprise a bond coat layer 18 adjacent to and overlaying metal substrate 14, wherein the thermal barrier coating 22 is adjacent to and overlies the bond coat layer 18. (See dependent Claim 9; paragraph [0031] at page 9 of Appellants' application; FIG. 4.) The claimed thermal barrier coating may have a thickness of from about 1 to about 100 mils and may have a strain-tolerant columnar structure. (See dependent Claims 10-11; paragraph [0012] at page 4 and paragraph [0032] at page 10 of Appellants' application.) The claimed thermally protected article 10 may be a turbine engine component, for example, a turbine shroud, wherein the thermal barrier coating 22 has a thickness of from about 30 to about 70 mils, or a turbine airfoil, wherein the thermal barrier coating has a thickness of from about 3 to about 15 mils. (See dependent

Claims 18-20; paragraph [0012] at page 4 and paragraph [0032] at page 10 of Appellants' application; FIG. 4.)

Appellants' claimed invention further relates to a method for preparing a thermal barrier coating 22 on an underlying metal substrate 14, the method comprising the step of: (A) forming thermal barrier coating 22 over metal substrate 14 by depositing a ceramic composition, which comprises: (1) at least about 91 mole % (e.g., from about 92 to about 95 mole %) zirconia; and (2) from about 5 to about 8 mole % (e.g., from about 5.5 to about 6.5 mole %) of a stabilizer component comprising: (a) yttria in an amount of from about 4 to about 6 mole % (e.g., from about 4 to about 5 mole %) of the composition; and (b) lanthana in an amount of from about 0.8 to about 2 mole % (e.g., from about 0.8 to about 1.5 mole %) of the composition, wherein (3) the composition has a mole % ratio of lanthana to total stabilizing component of from about 0.15 to about 0.35 (e.g., from about 0.2 to about 0.3). (See, for example, independent Claim 21, as well as dependent Claims 24-25 and 28; paragraph [0011] at pages 3-4, paragraph [0021] at page 5, and paragraph [0028] at page 8 of the Appellants' application.) The claimed method may comprise forming thermal barrier coating 22 on a bond coat layer 18 adjacent to and overlaying metal substrate 14, and may be deposited by physical vapor deposition to form a thermal barrier coating having a strain-tolerant columnar structure. (See dependent Claims 22-23; paragraph [0012] at page 4 and paragraph [0031] at page 9 of Appellants' application; FIG. 4.)

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

There is only one ground of rejection to be reviewed on this appeal. The sole ground of rejection to be reviewed is whether Claims 1-2, 6-12, 16-25 and 28 are unpatentable under 35 U.S.C. § 103(a) over U.S. Patent Application 2003/0224200 (hereafter referred to as "Bruce").

## ARGUMENT

### REJECTION OF CLAIMS 1-2, 6-12, 16-25 AND 28 UNDER 35 USC 103(a) AS UNPATENTABLE OVER BRUCE

In rejecting Claims 1-2, 6-12, 16-25 and 28 under 35 U.S.C. § 103(a) as unpatentable over Bruce, the Examiner has erred in the Final Office Action for at least two reasons: (1) the failure to clearly or adequately explain the basis for the alleged “overlapping ranges” of Bruce with Claims 1-2, 6-12, 16-25 and 28, thus making the rejection of these Claims *prima facie* improper under 37 C.F.R. 1.104(c)(2); (2) the failure to establish a *prima facie* case of obviousness under MPEP § 706.02(j) in rejecting Claims 1-2, 6-12, 16-25 and 28, again making this rejection *prima facie* improper; and (3) the specific failure to establish a *prima facie* case of obviousness under MPEP § 706.02(j) in rejecting Claim 19 which defines a turbine shroud having a thermal barrier coating with a thickness admittedly not taught by Bruce.

#### **1. THE FINAL OFFICE ACTION FAILS TO CLEARLY OR ADEQUATELY EXPLAIN THE BASIS FOR THE ALLEGED “OVERLAPPING RANGES” OF BRUCE WITH CLAIMS 1-2, 6-12, 16-25 AND 28, THUS MAKING THE REJECTION OF THESE CLAIMS PRIMA FACIE IMPROPER UNDER 37 C.F.R. 1.104(c)(2).**

Pages 2-3 of the Final Office Action alleges that, because Bruce discloses a ceramic thermal barrier coating of yttria stabilized zirconia having 1-10 wt% yttria and 0.1 to 4 wt% lanthana, this would create a composition “which when calculated into mol% readily overlaps the ranges of at least about 91 and between about 92-95 mol% zirconia, about 4-6 mol% [yttria] and about [0.8]-2 mol% lanthana with a total stabilizer component of about 5-8 mol% and where the mol% lanthana ratio to total stabilizing component is from about 0.15 to about 0.35 or about 0.2 to about [0.3],” referring to page 2, paragraphs [0010], [0015] and [0016], and page 3, paragraph [0023], of Bruce. The Office Action further alleges that the “overlapping ranges create a composition of from between about 87-91 wt% zirconia, 7-9.5 wt% [yttria] and 2.2-4.5 wt% [lanthana].”

This rejection of Claims 1-2, 6-12, 16-25 and 28 is *prima facie* improper because it violates 37 CFR 1.104(c)(2), which states that the “pertinence of each reference, if not apparent, must be clearly explained.” Instead, the Final Office Action leaves Appellants completely guessing as to what the basis is in Bruce for the alleged “overlapping ranges” that “create a composition of from between about 87-91 wt% zirconia, 7-9.5 wt% [yttria] and 2.2-4.5 wt% [lanthana].” For example, as was pointed out by Appellants’ prior response of June 6, 2006 to the Prior Office Action of April 7, 2006, it unclear whether the Examiner is relying on the alleged disclosure in Bruce of “a ceramic thermal barrier coating of yttria stabilized zirconia having 1-10 wt% yttria and 0.1 to 5 wt% lanthana” to “create a composition of from between about 87-91 wt% zirconia, 7-9.5 wt% [yttria] and 2.2-4.5 wt% [lanthana],” or whether the Examiner is relying on some other disclosure in Bruce.

In reply, page 5 of the Final Office Action alleges that:

“Bruce’s disclosure [creates] a [composition] which when calculated into mol% readily [overlaps] the ranges of at least about 91 mol% zirconia and about 92-95 mol% zirconia, about 4-6 mol% yttria and about [0.8]-2 mol% lanthana with a total stabilizer component of about 5-8 and about 5.5-6.5 mol% and where the mol% ratio of lanthana to total stabilizing component is from about 0.15 to about 0.35 and about [0.2] to about [0.3]. As the examiner indicates the weight percentages of  $Y_2O_3$  and  $La_2O_3$  of Bruce were converted to mol percentages. Within the range of possible combinations of these percentages lies combinations of mol percentages and mol ratios overlapping those of the instant Claims.

This reply from page 5 of the Office Action still fails to demonstrate, or adequately explain, what, exactly, is the basis for these alleged “overlapping ranges.” Appellants are still left to unfairly guess as to how the Office Action converted the

alleged percentages taught by Bruce to the alleged mole percentages, what combinations are actually taught by Bruce that are relied on, *etc.* In short, the Final Office Action still fails to comply with 37 C.F.R. 1.104(c)(2) in “clearly explaining the pertinence” of Bruce so that Appellants can fairly respond to, or even understand, what the basis is for the rejection of Claims 1-2, 6-12, 16-25 and 28 over Bruce.

For example, with regard to paragraph [0023], in terms of specific ranges, Bruce teaches (1) “about three to four weight percent yttria and alloyed to contain about 0.05 to about 1 weight percent lanthana;” and (2) “about one up to about ten weight percent yttria and about 0.1 to about 4 weight percent lanthana.” How the Final Office Action arrives at “a composition of from between about 87-91 wt% zirconia, 7-9.5 wt% [yttria] and 2.2-4.5 wt% [lanthana]” from these specified ranges taught in paragraph [0023] of Bruce is not adequately explained and is also not readily apparent. In fact, it is still completely unclear from the Final Office Action specifically how the ranges specifically taught by Bruce can allegedly “overlap” the mole % ranges of zirconia, yttria, and lanthana defined in amended Claims 1-2, 6-12, 16-25 and 28.

In particular, the Final Office Action nowhere adequately explains the basis for where Bruce teaches the claimed mole % ratios of lanthana to total stabilizing component defined in Claims 1-2, 6-12, 16-25 and 28. For example, paragraph [0023] of Bruce relied on in the Office Action does not specifically teach a mole % ratio of lanthana to total stabilizing component of from about 0.15 to about 0.35 (see for example, Claims 1, 8 and 21), or especially a mole % ratio of from about 0.2 to about 0.3 (see Claims 7, 17 and 28). Instead, Bruce says absolutely nothing about what the mole % ratio of lanthana to total stabilizing component should be. There is simply no basis in Bruce for one skilled in the art to pick any particular mole % ratio of lanthana to total stabilizing component, and especially the mole % ratios defined in the instant Claims.

In fact, Final Office Action admits that Bruce does not specifically teach the combination claimed ranges of zirconia, yttria, lanthana, and lanthana to total stabilizing component when the Final Office Action says that “within the range of possible combinations lies combinations of mol percentages and mol ratios” that allegedly

overlap those of the instant Claims. Instead, the Final Office Action simply engages in improper and unsupported speculation as to what these alleged “overlapping ranges” might be, not what is actually taught by Bruce. Indeed, the alleged “overlapping ranges” between Bruce and the instant Claims appear to be based on the personal knowledge of the Examiner, and not what is fairly taught by Bruce. Accordingly, and alternatively if the Board does not reverse this rejection of the instant Claims, the Board is respectfully requested to order the Examiner to supply an affidavit/declaration under 37 CFR § 1.104(d)(2) to provide her factual basis for this alleged “overlapping of ranges” since it appears to be based on her personal knowledge, and not what is fairly taught by the art relied on.

**2. THE FINAL OFFICE ACTION HAS FAILED TO ESTABLISH A *PRIMA FACIE* CASE OBVIOUSNESS UNDER MPEP § 706.02(j) IN REJECTING CLAIMS 1-2, 6-12, 16-25 AND 28, AGAIN MAKING THIS REJECTION *PRIMA FACIE* IMPROPER.**

The Final Office Action also improperly rejects Claims 1-2, 6-12, 16-25 and 28 by failing to establish a *prima facie* case of obviousness under MPEP § 706.02(j). To establish a *prima facie* case of obviousness, MPEP § 706.02(j) says that three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. (Emphasis added.)

Instead, page 3 of the Final Office Action alleges that it would be *prima facie* obvious to select the “overlapping portion” of the ranges disclosed by Bruce, citing the cases of *In re Malagari*, 182 USPQ 549 (Fed. Cir. 1974) and *In re Hoeschele*, 160 USPQ 809 (CCPA 1969). But as noted above, and contrary to at least the third criteria of MPEP § 706.02(j) (the reference “must teach or suggest all claim limitations”), it is inaccurate to characterize as “overlapping” the ranges taught by Bruce with instantly claimed ranges. For example, the Office Action has failed to properly show that the mole % ratio of lanthana to total stabilizing component of the claimed

compositions/thermal barrier coatings is taught by Bruce. The cited case law in the Final Office Action assumes that there are “overlapping” ranges between what is disclosed in the art and what is claimed, which is simply not true. Accordingly, the Final Office Action’s reliance on the cited case law to establish a *prima facie* case of obviousness is completely misplaced.

Instead, the Final Office Action completely fails to establish a *prima facie* case of obviousness under MPEP § 706.02(j) in rejecting Claims 1-2, 6-12, 16-25 and 28 over Bruce. In fact, page 3 of the Final Office Action even concedes that Bruce does not disclose “examples of compositions falling within the claimed ranges.” If Bruce does not disclose “examples of compositions falling within the claimed ranges,” simply alleging that Bruce discloses “overlapping ranges” is inadequate to teach or suggest, for example, the claimed ranges of zirconia, yttria and lanthana. In fact, the Federal Circuit has made clear that the disclosure of a range, even if “overlapping,” “does not constitute a specific disclosure of the endpoints of that range” or even “each of the intermediate points” in that range. See *Atofina v. Great Lakes Chemical Corp.*, 78 U.S.P.Q.2d 1417, 1424 (Fed. Cir. 2006). The Final Office Action has provided absolutely no proper basis for rejecting the instant Claims as obvious over Bruce, much less a *prima facie* case of obviousness under MPEP § 706.02(j), by simply alleging “overlapping ranges” where Bruce discloses no “examples of compositions falling within the claimed ranges.”

**3. THE FINAL OFFICE ACTION HAS FAILED TO ESTABLISH A *PRIMA FACIE* CASE OBVIOUSNESS UNDER MPEP § 706.02(j) IN REJECTING CLAIM 19, WHICH DEFINES A TURBINE SHROUD HAVING A THERMAL BARRIER COATING WITH A THICKNESS ADMITTEDLY NOT TAUGHT BY BRUCE.**

Page 4 of the Final Office Action further fails to establish a *prima facie* case of obviousness under MPEP § 706.02(j) in rejecting Claim 19 which defines a turbine shroud having a thermal barrier coating with a thickness of from about 30 to about 70 mils. The Final Office Action concedes that Bruce does not disclose a turbine shroud having a thermal barrier coating with a thickness of from about 30 to about 70 mils according to Claim 19. Instead, the Final Office Action alleges that, because paragraph [0017] of Bruce says the thickness of the thermal barrier coating “is sufficient to provide

the required thermal properties for the underlying substrate 22 and blade 10,” it would be obvious “to adjust the thermal barrier thickness for the intended application.”

The position of the Final Office Action regarding the alleged obviousness of the thickness range defined in Claim 19 is simply unsupported and improper speculation. The cited case law (*In re Boesch*) regarding selecting “optimum values” is irrelevant because, as even the Final Office Action concedes, no thickness range for thermal barrier coatings for turbine shrouds are taught by Bruce. Accordingly, there is absolutely no a proper basis alleged by the Final Office Action for rejecting Claim 19 as obvious over Bruce.

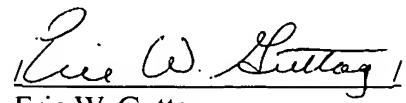
**SUMMARY OF ARGUMENT AND RELIEF REQUESTED**

Appellants submit that the of Claims 1-2, 6-12, 16-25, and 28 is unobvious over the prior art relied on in rejecting these Claims. The Final Office Action fails to clearly or adequately explain the basis for the alleged “overlapping ranges” of Bruce with Claims 1-2, 6-12, 16-25 and 28, thus making the rejection of these Claims *prima facie* improper under 37 C.F.R. 1.104(c)(2). In addition, the Final Office Action has failed to establish a *prima facie* case obviousness under MPEP § 706.02(j) in rejecting Claims 1-2, 6-12, 16-25 and 28, again making this rejection *prima facie* improper. Finally, the Final Office Action specifically fails to establish a *prima facie* case of obviousness under MPEP § 706.02(j) in rejecting Claim 19 which defines a turbine shroud having a thermal barrier coating with a thickness admittedly not taught by Bruce

*Application No. 10/748,520*  
*Attorney Docket No. 129968*

Accordingly, Appellants respectfully request the Honorable Board of Appeals and Interferences to reverse the Examiner's rejection and remand with directions to allow Appellants' application to issue with 1-2, 6-12, 16-25, and 28 currently pending.

Respectfully submitted,  
For: Irene SPITSBERG, *et al.*

  
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January 22, 2007



**CLAIM APPENDIX**

1. A ceramic composition, which comprises:
  1. at least about 91 mole % zirconia; and
  2. from about 5 to about 8 mole % of a stabilizer component comprising:
    - a. yttria in an amount of from about 4 to about 6 mole % of the composition; and
    - b. lanthana in an amount of from about 0.8 to about 2 mole % of the composition;
  3. wherein the composition has a mole % ratio of lanthana to total stabilizing component of from about 0.15 to about 0.35.
2. The composition of claim 1 which comprises from about 92 to about 95 mole % zirconia.
6. The composition of claim 1 which comprises from about 5.5 to about 6.5 mole % stabilizing component, wherein yttria is in an amount of from about 4 to about 5 mole % of the composition and wherein lanthana is in an amount of from about 0.8 to about 1.5 mole % of the composition.
7. The composition of claim 6 wherein the ratio of lanthana to total stabilizing component is from about 0.2 to about 0.3.
8. A thermally protected article, which comprises:
  - A. a metal substrate; and
  - B. a thermal barrier coating comprising:
    1. at least about 91 mole % zirconia; and
    2. from about 5 to about 8 mole % of a stabilizer component comprising:
      - a. yttria in an amount of from about 4 to about 6 mole % of the thermal barrier coating; and
      - b. lanthana in an amount of from about 0.8 to about 2 mole % of the thermal barrier coating;

3. wherein the thermal barrier coating has a mole % ratio of lanthana to total stabilizing component of from about 0.15 to about 0.35.
9. The article of claim 8 which further comprises a bond coat layer adjacent to and overlaying the metal substrate and wherein the thermal barrier coating is adjacent to and overlies the bond coat layer.
10. The article of claim 9 wherein the thermal barrier coating has a thickness of from about 1 to about 100 mils.
11. The article of claim 10 wherein the thermal barrier coating has a strain-tolerant columnar structure.
12. The article of claim 11 wherein the thermal barrier coating comprises from about 92 to about 95 mole % zirconia.
16. The article of claim 11 wherein the thermal barrier coating comprises from about 5.5 to about 6.5 mole % stabilizing component, wherein yttria is in an amount of from about 4 to about 5 mole % of the thermal barrier coating and wherein lanthana is in an amount of from about 0.8 to about 1.5 mole % of the thermal barrier coating.
17. The article of claim 16 wherein the ratio of lanthana to total stabilizing component is from about 0.2 to about 0.3.
18. The article of claim 11 which is a turbine engine component.
19. The article of claim 18 which is a turbine shroud and wherein the thermal barrier coating has a thickness of from about 30 to about 70 mils.

20. The article of claim 18 which is a turbine airfoil and wherein the thermal barrier coating has a thickness of from about 3 to about 15 mils.

21. A method for preparing a thermal barrier coating on an underlying metal substrate, the method comprising the step of:

- A. forming a thermal barrier coating over the metal substrate by depositing a ceramic composition, which comprises:
  1. at least about 91 mole % zirconia; and
  2. from about 5 to about 8 mole % of a stabilizer component comprising:
    - a. yttria in an amount of from about 4 to about 6 mole % of the composition; and
    - b. lanthana in an amount of from about 0.8 to about 2 mole % of the composition;
  3. wherein the composition has a mole % ratio of lanthana to total stabilizing component of from about 0.15 to about 0.35.

22. The method of claim 21 wherein a bond coat layer is adjacent to and overlies the metal substrate and wherein the thermal barrier coating is formed on the bond coat layer.

23. The method of claim 22 wherein the ceramic composition is deposited by physical vapor deposition to form a thermal barrier coating having a strain-tolerant columnar structure.

24. The method of claim 23 wherein the ceramic composition that is deposited comprises from about 92 to about 95 mole % zirconia.

25. The method of claim 24 wherein the ceramic composition that is deposited comprises from about 5.5 to about 6.5 mole % stabilizing component, and wherein

yttria in an amount of from about 4 to about 5 mole % of the composition and lanthana in an amount of from about 0.8 to about 1.5 mole % of the composition.

28. The method of claim 25 wherein the ratio of lanthana to total stabilizing component is from about 0.2 to about 0.3.

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**EVIDENCE APPENDIX**

There is no other "evidence" submitted by Appellants during prosecution that is referred to in this Appeal Brief.

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**RELATED PROCEEDINGS APPENDIX**

There have been no decisions rendered by a court or the Board in any proceedings related to this appeal.